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DISCUSSION

EQUITABLE HYDRANT RENTALS AND BETTER METHODS FOR APPORTIONING FIRE PROTECTION COST

By John W. Alvord

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Mr. Alexander Potter (*by letter*): The writer heartily endorses the plea of Mr. Alvord for more equitable hydrant rentals and better methods of apportioning fire protection costs, and regrets his inability to take part in the oral discussion of this paper. In the opinion of the writer Mr. Alvord's suggestion is undoubtedly a step in the right direction but does not wholly cover the difficulty, for the question of the city's added burden for fire protection must still be considered every time an extension is made to the piping system.

The writer is of the opinion that the fixing of a general tax-rate for fire protection will wholly obviate the difficulty which now exists in the hydrant rental method of payment.

Of course, the contract with the water company must contain proper provisions for the construction of extensions of adequate size when demanded. Such a provision is not difficult of enforcement.

As forming a proper contribution to the discussion of Mr. Alvord's paper, the writer presents extracts from a report submitted by him to the city of San Antonio, Texas, in June, 1912, but which has not been submitted heretofore to any technical paper. The writer's suggestion in this instance received the endorsement of the company's engineer, Mr. Leonard Metcalf.

There is, perhaps, no subject in connection with the furnishing of water to cities in which there has been more divergence of opinion than that of the method of paying for the service rendered for fire protection, both public and private.

HYDRANT RENTAL NOT PROPER METHOD

The time-honored custom of paying for fire protection at so much per hydrant is antiquated and unjust, both to the water company and to the city.

It is a well known fact that any reasonable price charged for a fire hydrant is normally far in excess of the value of the water likely to be taken from that hydrant in the course of a year for fire protection; consequently, there is a feeling that the price is unjust and unfair to the taxpayers. On the other hand, if fire protection is omitted, the cost of a plant adequate to supply water for private consumption would be approximately half of the cost. The amount of this added cost for adequate fire protection varies with the size of the city. In a small plant, say from five to ten thousand people, this cost probably will be approximately 60 per cent of the total cost of the plant; whereas, as the city increases in size, the extra cost of providing the piping system and pumps of adequate capacity to meet the most exacting fire demands, will probably increase the cost of the plant 15 or 20 per cent. Of course, that is on the assumption that the plant has actually been built to meet this dual demand, and is not simply assumed to be capable of furnishing fire protection. Fire hydrants located at uniform distances along the mains imply, but do not necessarily insure, adequate fire protection.

FALSE ECONOMY IN ORDERING HYDRANTS

Another serious objection to paying for fire service per hydrant is the economic tendency ever present in every municipal council throughout the country to limit the fixed expenditures for all city needs to the lowest possible amount. City officials are not likely to order the water company to place one hundred and fifty hydrants if they believe that one hundred hydrants will carry them through. As there can be no absolute way of fixing the blame for inadequacy in fire protection, the tendency is to play for the popularity which comes to him who keeps down taxes and trusts to good fortune that no conflagration will result from the inadequacy of the fire protection service. You therefore see that both from the company's standpoint and from the city's standpoint, the payment of fire protection at so much per hydrant is an erroneous one.

In San Antonio, the amount paid the water company at present for all public uses is $24,000. On any reasonable and ordinary basis for charge of water the city of San Antonio uses no less than $10,000 worth of water for street sprinkling and other public uses, leaving $14,000 for the charge for fire protection. There are about 1309 fire hydrants at the present time, which makes the charge per hydrant for fire protection $10.70; for all purposes, about $18. This forms so small a percentage of the total income of the water company, less than 4 per cent, that it is seen that the water consumer pays practically the entire cost of fire protection, and the non-resident taxpayer and the owner of unimproved property gets off, to all intents and purposes, scotfree from any charge for the benefits derived from the introduction and maintenance of a system of water supply. Not only this, but the water company being taxed, as it is, both on the value of their plant and for doing business in the state, the amount contributed by them to the city and county treasuries, lessens the taxes which would otherwise have been paid by the non-resident property owner and by the owner of vacant property. I think it will be admitted by all that an up-to-date water plant in the city is of inestimable value to the non-resident taxpayer as well as to the owner of unimproved real estate, and when we consider that only 4 per cent of the income of the water company is received from the general taxes, to which alone the non-resident taxpayer and vacant lot owner contribute, it will be seen at a glance how the water consumer and small householder is arbitrarily imposed upon for the benefit of the non-resident property owner and the owner of unimproved real estate.

VALUE OF FIRE PROTECTION PER CAPITA

From personal investigation of the question of fire protection, it may be set down as a general rule that water for fire and other purposes will average $1 per capita, with a variation as high as 40 per cent above or below this sum, depending upon the local conditions in any particular city. As will be seen in another part of this report, the conditions in San Antonio are such that the minimum limit under this rule should prevail as the maximum charge in San Antonio; that is to say, a reasonable charge for water for all public uses should be 60 cents per capita; or, on a basis of 100,000 population, $60,000 per year, instead of $24,000 a year, the present amount collected by the water company for this service. . . . .

METHOD OF FIXING PRICES FOR FIRE PROTECTION

As fixed in San Antonio, the price for fire protection is unfair both to the city and to the company. It is equally unfair to absorb this entire fire protection charge in the rates. It also discriminates against the resident water consumer in favor of the non-resident taxpayer and the owner of vacant property in meeting the city's just expenses for fire protection. It becomes necessary, therefore, to devise some other means for the proper apportionment of this cost of providing the city with water for public needs, and I can conceive of no better plan than that a tax should be fixed upon the assessed valuation, which automatically and properly increases from year to year as the assessed valuation increases. The water company must be compelled to construct mains of adequate size to meet the growing demand of the city, and there should be no limitation as to the number of fire hydrants which the city may place upon the city mains. It is considered good engineering practice to place an average of eighteen hydrants per mile upon city mains in the congested district, and ten per mile outside this district. The cost of any increased number of hydrants over this average amount should necessarily be borne by the city. The city would be the direct beneficiary of an increase in the number of hydrants, for the greater the number of hydrants, the closer they will be together, and the less the amount of hose and other equipment the fire department is obliged to carry. The value to the city of this reduction in hose will far exceed the cost of furnishing additional fire hydrants. The shorter the hose length, moreover, the more effective the fire stream. This increase in the amount to be paid directly by the city represents, roughly speaking, the interest on about $600,000 or $700,000 which the city has a perfect right to demand the company to expend in providing adequate fire protection for the city. As will be seen under the discussion of fire insurance rates, the expenditure of this money on the part of the water company and the payment by the city of this increased amount of fire protection, will result in a saving to the city of at least $150,000 to $200,000 in insurance premiums.

Mr. W. C. Hawley: Mr. Alvord's paper brings up again a subject which demands explanation and discussion until water works men agree that the present annual-rate-per-hydrant method of charging for fire protection is wrong in theory and in practice, and have substituted for it some just and practical method of apportioning and collecting a proper charge. The method suggested has much merit and can, doubtless, be worked out in many cases in a satisfactory manner, as in the Freeport case, although as will be shown later in this discussion, the rates named appear to be too low. There are cases, however, where the plan could not be used and there are particular difficulties which would probably prevent the securing of satisfactory results in some others. Take the case of two or more municipalities where the supply main passes through one town to reach the other, being part of the distributing system in the first town. Naturally the people of this town will object to paying for a large pipe which is required for the service of the second town. This condition will be more complicated if there are several towns to supply instead of two.

The principal difficulty in carrying out the plan suggested would be the objection of the municipal authorities in the future to the laying of large sized pipes because of the increased charge for fire protection. To illustrate, the company with which the speaker is connected entered into a contract for furnishing fire protection with one of the municipalities which it served, three years ago. The rate charged was based upon the length of pipe in the distribution system within the municipal limits. In order that there should be no question as to the reasonableness of any future extensions of the pipe lines, the following paragraph was put into the contract:

> It is further agreed that extensions of the distribution pipe lines of the first party shall be made only upon written application of the owner or owners of property desiring a supply of water therefor, and upon approval of the petition of the said owner or owners by resolution of Boro Council or upon the approval by council of any extension asked for by the party of the first part. When such petition has been approved by Boro Council, the first party

shall proceed to lay the pipe and shall be entitled to include it in computing bills for fire protection at the rates hereinbefore mentioned from the date that the pipe lines are completed and put into service.

Recently an application was made to the water company for a supply of water to a laundry at a point on a street about 100 feet from the main on an intersecting street. There was already laid to a point somewhat beyond the laundry a $\frac{3}{4}$-inch screw pipe. The laundryman asked for a 2-inch service line. He, therefore, petitioned the water company to extend a 4-inch pipe from the main to a point in front of his property and his petition, approved by the water company, was presented to Boro Council for its approval in accordance with the contract. The approval received from the Boro clerk was a brief note saying that Boro Council had approved the laying of a *2-inch* pipe. To this the water company replied that evidently a mistake had been made as the petition was for a 4-inch line and that the supply demanded was beyond the capacity of a 2-inch line, whereupon we were advised, "Boro Council is of the opinion that a 2-inch line is ample." Now, as a matter of fact, Boro Council had no interest in the size of the pipe further than that if a 4-inch pipe or larger was laid it would increase the annual payment for fire protection. We can well imagine, therefore, under the arrangement proposed by Mr. Alvord's paper that when a water company finds it necessary to lay a 20-inch main through certain streets to properly reinforce its distribution system, the butchers, bartenders, druggists and socialists in city council will, in their combined wisdom, decide that an 11-inch main is as large as they care to pay for. This difficulty may be avoided in those states having a public service commission, or, possibly, by arbitration provided for in the contract, but it is likely to be annoying and expensive.

After all, the thing of greatest importance in this connection is that the total sum received for fire protection should be adequate and reasonable. That a return for the hydrants should not be included is obvious. The rate per hydrant should be merely sufficient to cover fixed charges and maintenance on the hydrant and hydrant branch. This should remove any incentive to false economy on the part of the municipal authorities and has resulted, in the speaker's experience, in a material increase in the number of fire hydrants in every municipality supplied under this plan. The amount of the fire protection charged other than for hydrants may be distributed in a number of different ways, as for instance, on the basis of population, or miles of streets, or area of municipality, or assessed valuation, or upon length of pipe in distribution system. In any case, it is a more or less arbitrary method of distributing the charge and the important thing is that it should not be too arbitrary to be approved by the courts and that it should provide for an increase in fire protection rates as the system is extended that will be reasonable and just. For these reasons, it is probably wise to distribute it in proportion to the length of pipe system and this may be modified as has been suggested in Mr. Alvord's paper. In any case the total is assessed upon the valuation of the property and in this way more valuable property pays an increased amount of fire protection and is not affected in any way by the size of the pipe in the street in front of it. In fact it is not quite clear just how an increased charge per foot of main for a large size can be collected from the abutting property.

Incidentally, the rates proposed by Mr. Alvord seem to be much too low. In the Freeport case he states that 44 per cent of the investment was necessary for fire protection. Taking the cost of a 4-inch pipe line at 65 cents per lineal foot, 44 per cent of its value would be 28.6 cents. Figuring interest, depreciation, taxes and maintenance at a total of 8.5 per cent, we would have on this amount 2.4 cents per lineal foot instead of 2 cents. In the same way, figuring on a 16-inch pipe at $2.50 per foot we find that a charge of about 9⅓ cents should be made instead of 8 cents as given. These figures allow nothing for profit and do not take into consideration any portion of the plant except the pipe.

Applying the rates given to the pipe in the Boro of Wilkinsburg, Pennsylvania, a total length of 29.4 miles, would give a total revenue of $5135, whereas if there was an average of seven hydrants to the mile at a rate of $30 per hydrant, the hydrant rental would amount to $6150 per year. As a matter of fact, on the rate which is being charged, $275 per mile per year, or about 5.21 cents per foot, we are collecting $8087 plus $6 per year per fire hydrant, and these rates are only about half of what the service actually costs. It seems evident, therefore, that the rates stated are considerably too low for the ordinary water works plant.

A method of charging a rate per mile of distribution pipe system was mentioned in the paper presented by Messrs. Metcalf, Kuichling and Hawley at the Rochester meeting (see *Proceedings Am. W. W.*

Assoc., for 1911, p. 65). The case cited was that of the Pennsylvania Water Company and the rates at that time were before the court for a determination of their reasonableness. They were approved by the Court of Common Pleas of Allegheny County and later in an opinion handed down in January of this year, by the Supreme Court of the State, and they are now in force and two contracts based on these rates have been approved by the State Public Service Commission. This, so far as the speaker knows, is the first practical application of fire protection charges on this basis and it may be of interest to note that this method of charging for fire protection was first proposed, so far as the speaker knows, by Mr. George S. Davison, Mem.Am.S.C.E., Vice-President of the Pennsylvania Water Company. This method seems to have appealed to the Railroad Commission of Wisconsin as a similar method of payment in the case of extension of mains when ordered by the city was approved by it in the Green Bay Water Company case, decided October 14, 1913.

The discussion of this matter at the present time is largely academic. It is valuable, however, as pointing out the gross unreasonableness of the rates and method of charging which obtain almost universally in this country today. The first practical step will be for each water company to determine what it should receive for fire protection service and then to take such steps as are necessary to collect it. The days for free service of any kind or for loading one branch of service with the deficit caused by unreasonably low rates on another, are rapidly drawing to an end. Doubtless, it will take much effort to educate our courts, but in good time we may reasonably expect that they will approve the proposition. The municipal plants should not be behind the private water companies in adjusting the rates for fire protection and thereby relieving their domestic consumers. This is done in some cases now through the raising of interest and sinking fund charges by general taxation or by the payment of a flat rate for water used for municipal purposes. If the results in such cases are equitable between the various classes of service it is an accident. The amount raised by direct taxation should be properly estimated and charged for as service rendered. If this was done, it would result in many cases in a reduction of rates to the domestic consumer. In these days, when economy and efficiency are the watchwords, there should be no objection on the part of the taxpayers to the putting of their plants on a just and proper financial basis.

Mr. J. N. Chester: In regard to Mr. Alvord's paper, the speaker has applied his basis to five different plants, and his conclusion is that, while the method may be a good one, the unit price is entirely too low. Take 1.2 cents per inch foot, we will say, 6-inch pipe, for each 500 feet yields $25, which is too little. Mr. Alvord shows in his paper how the Wisconsin Commission has allowed about 50 per cent of gross revenue, in cities of from 10,000 to 15,000, for fire hydrant rentals. Applying Mr. Alvord's maximum price of $8 per hydrant and $\frac{7}{10}$ cent per inch foot, in the case of Jefferson City, Missouri, it would produce $5600 out of say $50,000 gross, which would not be over 12 per cent, instead of the 50 per cent indicated by the paper as being about the proper thing. Now applied to the Edgeworth Water Company, it increases the hydrant rental about 50 per cent. The speaker does not find, in any of these applications, that it will produce over 12 per cent of the present revenue applied in its maximum; therefore he is of the opinion that it needs to be multiplied by three or four, instead of squaring it, or some other method, as Mr. Barnet suggests. The speaker has always liked the method outlined by Mr. Hawley, as being the most equitable, for, it seems to him, that a frontage tax would be the most equitable distribution of fire protection.

The following table gives the results of the application of Mr. Alvord's method in five cities as compared with the present income for the same water works:

PLANT	1 NUMBER OF INCH-FEET IN MAINS	2 INCOME AT .4 CENTS PER INCH-FOOT	3 INCOME AT $5 PER HYDRANT	4 INCOME AT .7 CENTS PER INCH-FOOT	5 INCOME AT $8 PER HYDRANT	6 TOTAL INCOME BY ALVORD METHOD AT LOWEST RATE COL. 2 + COL. 3	7 TOTAL INCOME BY ALVORD METHOD AT HIGHEST RATE COL. 4 + COL. 5	8 PRESENT INCOME FROM HYDRANTS	9 PRESENT RATE PER INCH-FOOT AFTER DEDUCTING $5 PER HYDRANT	10 TOTAL PRESENT YEARLY REVENUE	11 PER CENT OF REVENUE FROM FIRE HYDRANTS
Capital City Water Co.	556800	$2227	$755	$3898	$1208	$2982	$5106	$5600	$0.0087	$48738	11.5
Edgeworth Water Co..	370600	1482	320	2594	512	1802	3106	1920	0.0043	20566	9.4
Monongahela Water Co	544000	2176	225	3808	360	2401	4168	1800	0.0029	22609	8.0
Ohio Valley Water Co.	2511800	10047	1865	17583	2984	11912	20567	15145	0.0053	158259	9.6
Johnstown Water Co...	1318600	5274	870	9230	1392	6144	10622	4350	0.0026	195874	2.2